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mobile coverage solutions

RF repeater user's manual

Installation / commissioning of RF repeaters by anyone, is done at own risk.

Thank you for choosing our mobile phone repeater.

Nowadays, people use mobile phones everywhere. But, unfortunately, due to loss of wireless signal transmissions (wireless), in different environments, and also due to the effect of building walls, there will be some areas of weak signal, or even mild loss of data even around the GSM signal station. This can lead to missed opportunities of business for example.

The repeater can amplify the signal required for the cell phone to work under normal conditions. Please read the user's manual before use, installation and commissioning.

1. Functions

People can communicate easily using a mobile phone, that is very true. Because the effect of obscurity in wireless communications and electromagnetic shielding, when people get into spaces like hotels, buildings, offices, underground parking lots, mobile signal disappears, so that it becomes impossible to use your mobile phone. Sometimes this can cause loss of data and valuable information for the period in which no signal is received and also can imply financial losses.

The RF repeater (GSM, 3G, 4G) is a low power device that compensates for the lack of signal and covers a limited land area to ensure communication with the mobile phone. Our repeaters operate on full duplex (talk and listen in the same time).

The full duplex repeaters are equipped with SAW filter (surface acoustic wave) and ALC (automatic gain control level), have a low power, are safety in operation, low noise and a linear gain over the entire bandwidth.

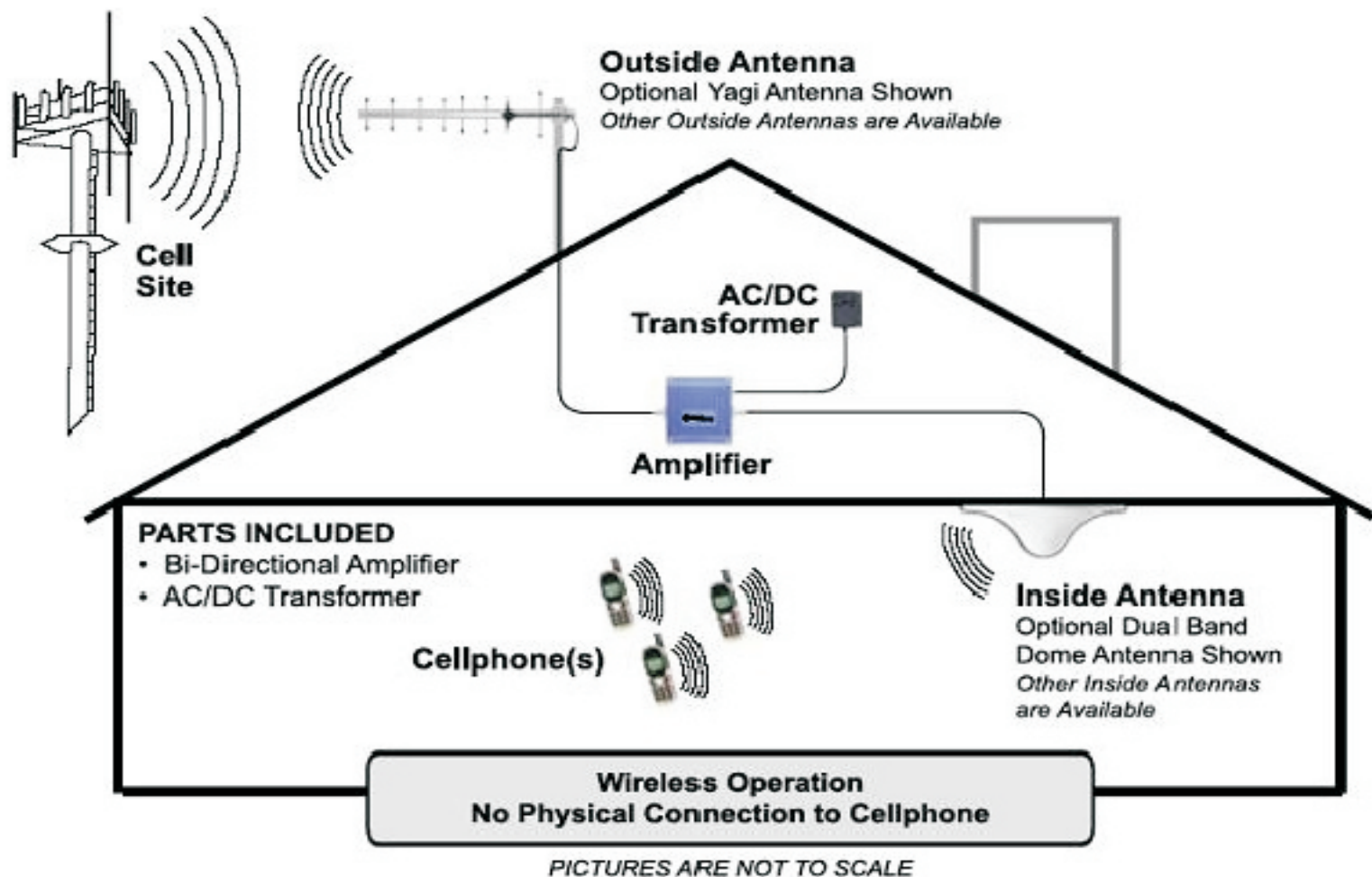
2. Characteristics

Adopts two ports built in full duplex mode

It's practical, easy to use and to install

It is reliable, designed to meet the standards EN 60950-1 + A11, EN 301 489-1/-8, EN 301 502. ATT & ALC Auto-adjustment of signal level





4. Installation instructions for a fixed RF repeater

Important !

Before commissioning the system is recommended to contact the telecom service operator, which you want to receive and amplify the signal to be informed about installation and operation of the device.

Installing the outdoor antenna

On the top of the building, choose a position liberated from the building, where your phone receives at least 2 bars. Choose so that is easy to install, assembled and maintained.

- ☐ Keep external antenna away from power lines, nets and solid metal construction, high voltage cables, transformers as they can disrupt the antenna parameters.
- ☐ You can be killed if the antenna is near power lines/cables

Adjust the direction of the external antenna is required and extremely important. Use the measuring device you have, connecting it to the antenna. Select the direction of the strongest signal, adjusting the angle of elevation and azimuth.

Ensure that the distance between the indoor antenna and the external antenna is not greater than 10m (total length of cable). To avoid sel-oscillation, the external antenna should be at 5-6meters above the indoor antenna, on a vertical axis and in opposite direction (as in the figure below)

For a proper installation, site selection is very important for the entire project. Using signal measurement devices, like a spectrum analyzer, or a mobile phone application will help pointing the external antenna to the BTS and obtain the maximum signal gain. Checking the operation of a cell phone is one of the easiest ways. Testing the signal with the mobile phone is not as accurate compared to a spectrum analyzer, because it is much slower.

Best results are obtained if measurements are made with an external antenna connected directly to the phone, using Net Monitor function, specified above.

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The installation can be started after connecting the external antenna on the phone, scanning the area and the discovery of several directions of signal reception. Choose the direction with the best signal reception.

Installing the outdoor antenna

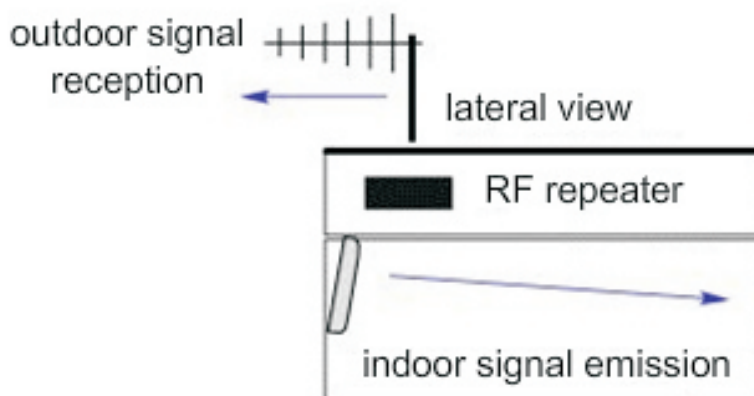
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RF separation between external and internal antenna



The indoor panel antenna will be tilted forward and positioned on the wall at 180cm height of the ground

Isolation and separation of antennas, refer to the minimum distance required (5-8 meters, depending on the building property) separating the external antenna (Yagi) from the indoor antenna (panel or ceiling) for not to cause self-oscilation of the RF repeater. This can easily be done by positioning the two antennas (indoor and outdoor) one-under-side and back-to-back, as the sketch above.

After completing the above work, and have identified the best direction for signal reception, you can fit the antenna but not definitive because it might need to make some adjustments after installing the indoor antenna and the repeater.

Antenna isolation chart with at least 1 wall separation

| Repeater model | Frequency | Min. vertical distance |
|-----------------|-----------|------------------------|
| ST900A-mini GSM | 900Mhz | 3 meters |
| ST 950 | 900Mhz | 3.5 meters |
| ST 960 | 900Mhz | 4.5 meters |
| ST 970 | 900Mhz | 5.5 meters |
| ST 980 | 900Mhz | 7 meters |
| ST 990 | 900Mhz | 10 meters |

Repeater installation

Fasten the device with 4 M4 screws. Make sure the selected location is dry, with access at the power supply and away from high temperature or a heat source.

Check the cables are not bottleneck in the corners, not cracked, and the connectors are well crimped.

Very careful in handling the connectors - Do not pull or unscrew !

Indoor antenna installation

Anyone who wants to improve the signal coverage in a specific area, is obliged to inform the network operator that is subscribed, to solve the problem, or to appeal to companies accredited by telecom operators.

For an efficient functioning of the system, adequate placing of the indoor antenna is essential. Incorrect installation can lead to self-oscillations in the system.

It is important to work with care and attention when installing the indoor antenna in a good position, and isolated from the external antenna.

- ☐ Place the indoor antenna where you want, but test the signal distribution all over the room (using your measuring device or mobile phone)
- ☐ Adjust the indoor antenna to a reasonable signal distribution in the room
- ☐ If not satisfied with the signal distribution, reposition the indoor antenna
- ☐ When you have completed the positioning of the indoor antenna, use the mounting bracket
- ☐ Indoor antenna is positioned perpendicular to the ground, vertical on the wall and must be placed at least 1.60m to 1.80m height from the ground, and inclined forward
- ☐ In order to reduce loses and increase the indoor coverage when installed, the cable should be as short as possible

Coverage increases when changing the antennas with higher gain but can change the operating mode of the repeater.

The device is a RF wide band repeater, making the following situations requiring attention:

- ☐ Where there are more than 2 mobile operators, working in the same frequency band of the repeater, and a BTS is located a few hundred feet from the installation site and the other mobile operator has the BTS a little further, then the dominating signal will be amplified with priority.
- ☐ ALC (Auto Level Control) in this case works to 35 dB. The stronger signal will be amplified rather than the lower one.
- ☐ Attach the cable on the wall, window etc and the holes to be consistent with the cable diameter
- ☐ The outdoor cable connects on the repeater at the OUTDOOR port, and the indoor cable connects the repeater at the INDOOR port

Testing and commissioning

Test the mobile phone signal everywhere in the room, when the signal on the phone indicates 3 or 4 bars at the corner of the room, in the diametrically opposite place from the indoor antenna, it means you have the best indoor reception. If you don't, resume the installation of the external antenna, it might not be receiving the best outdoor signal, or check if there is enough RF separation between indoor and outdoor antenna. For not causing self- oscillation, the repeater will decrease automatically it's gain and this will result in a smaller coverage area.

If you notice that during the phone call, the caller will not hear you well, or with interruptions, and you have a good reception, then you need to reposition the external antenna with very fine movements from left to right or vice versa. After repositioning wait 10 seconds to initialize and try to call again. Repeat this procedure until you have a good reception and transmission rate, without interruption.

Uplink LED will start flashing on and off during a call in normal operating conditions.

Questions and Answers

Self-oscillation

Improper installation of antennas, change their place as soon as possible !

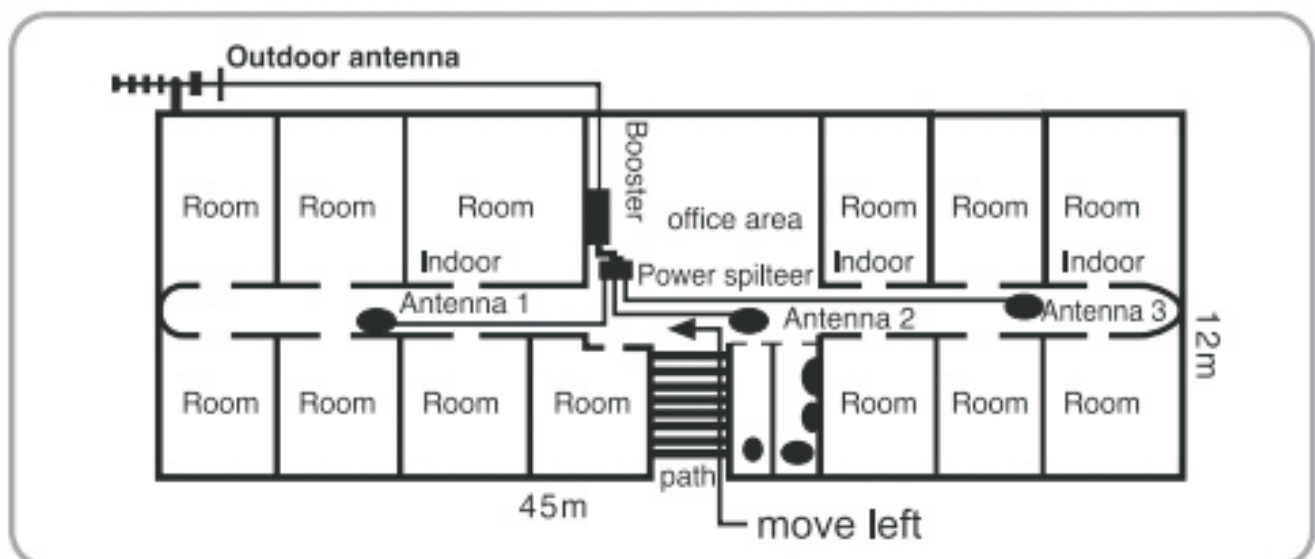
You know your system is self-oscillating when:

- ☐ Have a maximum signal level on the phone but when making a call, the call is not initialized – call dropped or error in connection
- ☐ Both Uplink and Downlink LEDs are flashing ON-OFF
- ☐ The signal drops to null suddenly when repeater is ON

To avoid please increase the distance between external antenna and indoor antenna and be sure the amplified signal is not emitting into the outdoor antenna !

Note: Avoid L mode coverage before you choose the installing position of indoor antenna.

Take example, the indoor antenna2 installed on the walkway exit had better move left, in order to make the walkway within the coverage of antenna.



Strong signal in some places, weak in the remaining locations

It means that power is unevenly distributed due to irregularities due to the internal antenna. If the signal is weak in several positions, you can distribute a line from the amplifier, so many places to be covered properly by using a splitter and extra indoor antennas - but should be taken into account that the signal emitted by many indoor antennas will subside and then you will need to use a repeater with higher output power and gain.

Low signal all over the place

If the system was correctly installed, it means that the repeater is too weak and need to be replaced with a more powerful one

Safety instructions

Do not handle with wet hands. Do not use if the casing, cable or plugs are damaged.

Do not leave the charger unattended during use

Do not allow to be used by children.

ATTENTION!

Commissioning of the system to amplify the signal prior to ensure that they complied with all the steps of installation, draws from the loss of warranty!

Power cord and PE bag can cause death by asphyxiation in infants!

All transformations performed in its own sphere can cause worsening of safety and operational performance and may jeopardize the safety of the user or damage to the corresponding systems